

CLAIMS

1. A transmitter for transmitting a device activation signal or other data, for remotely actuating a device, the device activation signal having an RF carrier frequency and a power level, said transmitter comprising:

a controller operable in an operating mode or providing a tune level signal that identifies the RF carrier frequency of the device activation signal;

a signal generator circuit coupled to the controller for generating the device activation signal, such that the RF carrier frequency corresponding to the controller tune level signal is generated; and

a detector circuit for detecting the power level of the device activation signal, the detector circuit providing the detected power level to the controller.

2. The transmitter of Claim 1, further comprising a transmission antenna assembly coupled to the signal generator circuit for transmitting the device activation signal, transmission antenna assembly having an impedance and being tunable in response to a tuning signal such that the impedance of the transmission antenna assembly is controllable thereby controlling the power level of the transmitted device activation signal.

3. The transmitter of Claim 2, wherein the controller generates the tuning signal in response to the detected power level.

4. The transmitter of Claim 3, wherein the controller further includes an antenna tuning module operable for tuning the impedance of the transmission antenna assembly in response to the detected power level of the device activation signal.

5. The transmitter of Claim 4, wherein the antenna tuning module includes:

a coarse tuning module operable to tune the transmission antenna assembly before applying the modulation scheme such that power level of the device activation signal is controlled; and

a fine tuning module operable to tune the transmission antenna assembly over a limited tuning range while applying the modulation scheme.

Ⓐ 6. The transmitter of Claim 5, further including a prescaler coupled from the signal generator circuit to the controller for providing a sample of the RF carrier frequency to the controller, wherein the controller adjusts the RF carrier frequency is adjusted to a desired frequency.

✓ 7. The transmitter of Claim 1, further comprising an gain circuit coupled to the signal generator circuit, for controlling the power level of the device activation signal, the gain circuit being responsive to a gain signal.

✓ 8. The transmitter of Claim 7, wherein the controller generates the gain signal in response to the detected power level.

✓ 9. The transmitter of Claim 1, further including a receiving antenna for receiving an activation signal of a remote transmitter, and  
wherein the controller further includes a training routine module operable to store data corresponding to the original remote transmitter activation signal for generating the output signal such that the device activation signal generated by the signal generator circuit corresponds to the activation signal of the remote transmitter.

✓ 10. The transmitter of Claim 9, further comprising a gain circuit coupled to the signal generator circuit for controlling the power level of the device activation signal, the gain circuit being responsive to a gain signal provided by the controller;  
the training routine module being further operable to store a starting point transmission power value from which a target detector voltage is determined; and  
the controller further operable to generate the gain signal in response to the target detector voltage and the detected power level.

✓ 11. A transmitter system for transmitting a device activation signal that includes an RF carrier frequency, modulation scheme, and data code for remotely actuating a device, comprising:

a controller operable in an operating mode for providing an output signal that identifies the frequency and code of the device activation signal;

a signal generator circuit coupled to the controller for generating the device activation signal such that the RF carrier frequency and data code corresponding to the controller output signal are generated;

a transmission antenna assembly, being coupled to the signal generator circuit for transmitting the device activation signal, the transmitted activation signal having a power output; and

a detector circuit for detecting a power level representative of the transmitted activation signal power output, the detector circuit coupled to the controller for providing the detected power level.

✓ 12. The transmitter system of Claim 11, wherein the transmission antenna assembly is tunable in response to a tuning signal such that the impedance of the transmission antenna assembly is varied, whereby the power output of the transmitted activation signal is controllable.

○ 13. The transmitter system of Claim 12 wherein the controller further includes an antenna tuning module activable for tuning the impedance of the transmission antenna assembly in response to the detected power level.

✓ 14. The transmitter system of Claim 12, further comprising a gain circuit coupled to the signal generator circuit, for controlling the power output of the device activation signal, said gain circuit being responsive to a gain signal.

✓ 15. The transmitter system of Claim 12, further comprising a gain circuit coupled to the signal generator circuit for controlling the power output of the device activation signal, the gain circuit being responsive to a gain signal provided by the controller; and

the controller being further operable to store a starting point transmission power value from which a target detector voltage is determined, the controller operable to generate the gain signal in response to the target detector voltage and the detected power level.

✓ 16. The transmitter system of Claim 15, further including a receiving antenna for receiving an original activation signal of an original remote transmitter associated with an original receiving unit, and

wherein the controller further includes a training routine module operable to store data corresponding to the original remote transmitter activation signal for generating the output signal, such that the controller output signal corresponds to the original activation signal.

✓ 17. The transmitter system of Claim 16, further comprising a user interface and wherein the signal generator circuit includes a voltage controlled oscillator.

(8) A method of transmitting a device activation signal for remotely actuating a device, the device activation signal having an RF carrier frequency and a power level, comprising the steps of:

providing a transmission antenna assembly having a tunable impedance;  
generating the RF carrier frequency;  
generating an antenna assembly tuning signal for controlling the antenna assembly impedance;  
transmitting the device activation signal;  
detecting the activation signal power level; and  
adjusting the antenna assembly tuning signal in response to the detected activation signal power level.

19. The method of Claim 18 further comprising the steps of:  
storing a starting point transmission power value;  
determining a target detector voltage based on the starting point transmission power value;

comparing the detected activation signal power level to the target detector voltage; generating a power level control signal for controlling the power level of the device activation signal; and

adjusting the power level control signal such that the detected activation signal power level approximately corresponds to the target detector voltage.

20. The method of Claim 18 wherein the step of generating the RF carrier frequency further comprises the steps of:

generating a tune level signal for controlling the RF carrier frequency;  
generating the RF carrier frequency in response to the tune level signal;  
sensing the RF carrier frequency; and  
adjusting the tune level signal in response to the sensed RF carrier frequency.

21 A transmitter for transmitting a device activation signal or other data, for remotely actuating a device, the device activation signal having an RF carrier frequency and a phase shift, said transmitter comprising:

a controller operable in an operating mode or providing a tune level signal that identifies the RF carrier frequency of the device activation signal;

a signal generator circuit coupled to the controller for generating the device activation signal, such that the RF carrier frequency corresponding to the controller tune level signal is generated; and

a detector circuit for detecting the phase shift of the device activation signal, the detector circuit providing the detected phase shift to the controller.